

BOWEN-LEBUS KNUCKLE JOINTS

Instruction Manual 4810



Bowen-Lebus Knuckle Joints

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Bowen-Lebus Knuckle Joints

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The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

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General Description

The **Bowen-Lebus Knuckle Joint** is an indispensable tool when fishing for lost tools or pipe in open hole or in greatly oversized cased holes. Its presence in the fishing string assures against misruns and allows retrieval of lost fish where they would otherwise be impossible to reach. This is particularly true where the upper end of the fish is located in a cavity or below a bridge or other obstruction.

Bowen-Lebus Knuckle Joints are capable of transmitting full torque at all times during operation. Any normal jarring, bumping, pulling or rotating may be fully utilized during fishing.

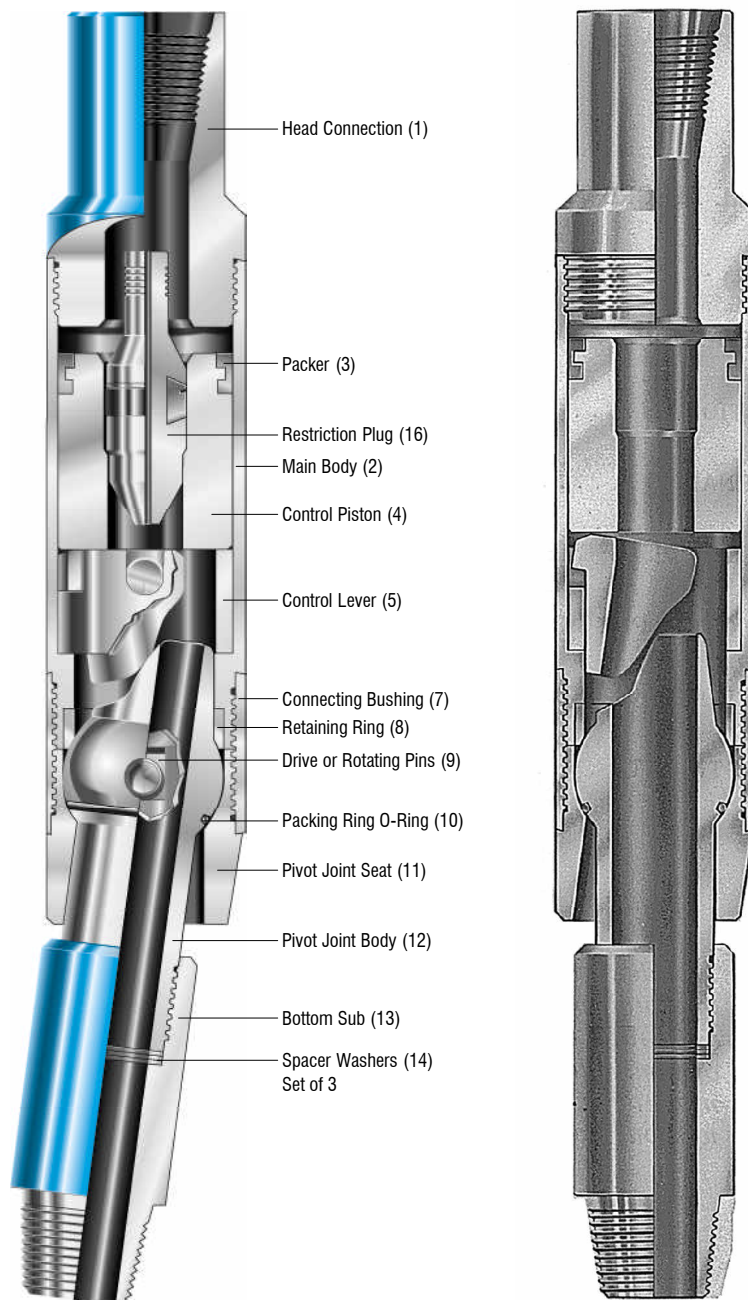
The full-opening bore of the tool allows use of inside cutters, logging instruments or other tools to be run through the Knuckle Joint during operation.

Use

The Bowen-Lebus Knuckle Joint is used to very good advantage in all fishing operations; either in cased holes that are greatly larger than the fish, or in open holes. Even in well conditioned holes, the Knuckle Joint aids in making quick easy contact and engagement with the fish.

The Knuckle Joint may be used with any fishing tool. It is particularly useful when running Bowen Overshots, although any Overshot, Releasing Spear, Taper Tap or other fishing tool may be run on the Knuckle Joint.

In cases where the top of the fish is in a cavity, and the fishing tool cannot be lowered over the fish, the knuckling action produced by the Knuckle Joint will add lateral reach to the fishing tool which can be gained in no other manner. The angling thus produced, greatly increases the area in which the fishing tool can effectively engage the fish.



Bowen-Lebus Knuckle Joint

Construction

The construction of the Bowen-Lebus Knuckle Joint is rugged and simple. It consists of the Knuckle Joint, a separate Restriction Plug to actuate the knuckling action, and a Restriction Plug Overshot with which to retrieve the Restriction Plug when required.

The Knuckle Joint is composed of a Head Connection, Main Body, Control Piston, Control Lever, Control Lever Cage, Connecting Bushing, Retaining Ring, Pivot Body, Pivot Joint, Bottom Sub, Drive Pins, Spacer Washers and Seals.

The inside diameter of the Control Piston may vary from the maximum allowable, and ordered any reduced diameter as required. During operation, when the Restriction Plug is dropped, it seats in the Control Piston, deflecting it downward, forcing the Control Lever and Control Lever Cage downward. This in turn causes the Pivot Joint to pivot to one side by a predetermined amount of approximately 7 degrees.

The Radial direction of knuckle is oriented by the use of more or less Washers between the Pivot Joint and Bottom Sub when the tool is assembled for use.

The Restriction Plug is essentially a dart with a Packer on its outside diameter. It has a tapered lower end and a fishing neck at its upper end. It has a restricted bore, through which circulation may be maintained to the fishing tool below, during operation. The fishing neck allows the Restriction Plug to be retrieved during operation by use of the Restriction Plug Overshot.

The Restriction Plug Overshot is composed of an Overshot Head, Body, Spring, Ring and Slips. It may be run on wire line and rope socket, or on a small (cutting) string of pipe or tubing, to fish

out the Restriction Plug. A drain hole in the Head is provided to omit the necessity of pulling a wet string when withdrawing the Overshot.

NOTE: Because of the variation in available tool joint pin bore sizes, the Control Piston (Part 4) is the only part that has a variable bore, not of standard size. When the Knuckle Joint is ordered, the required bore size must be stipulated, or the bore size of the tool joint pins the tool is to be used with. This will assure receiving the proper bore size in the Control Piston, and the proper size Restriction Plug to match it. If the Knuckle Joint is to be used with several different sizes of tool joints, be sure to order a Control Piston and Restriction Plug for each.

Refer to the Restriction Plug Overshot and Control Piston Table on pages 7 and 8 to aid in identifying and choosing Restriction Plugs, Restriction Plug Packers, Restriction Plug Overshots, Control Pistons, and Restriction Plug Overshot standard connections.

Operation

The tool is first assembled and inspected to assure that it is in good operating condition.

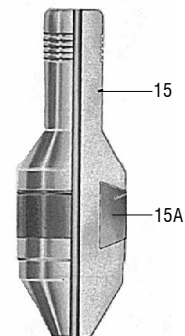
NOTE: Before or during assembly of the Knuckle Joint to the running string, check the bore of the Control Piston to assure that the bore is of the proper size. If the bore is too large, it will not stop and catch the Restriction Plug. Also, check the inside diameter of the joints of the running string to assure that they will pass the proper Restriction Plug; or else the Restriction Plug cannot reach the Knuckle Joint.

If the bore of the Control Piston is greatly undersize, it will cause the Knuckle Joint to function by force of the circulating mud pressure accidentally, and without use of the Restriction Plug.

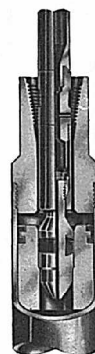
After the Knuckle Joint is made up to the fishing string, the Overshot or other



Restriction Plug Overshot



Restriction Plug



Restriction Plug Being Retrieved by Restriction Plug Overshot

fishing tool should be made up to the Knuckle Joint. If a Wall Hook Guide or Cut Lip Guide is being used on the Overshot, check whether the cut lip is positioned properly to contact the fish when the Knuckle Joint is caused to knuckle. Knuckle the Knuckle Joint by hand to determine this. If it does not, correct it by removing the Bottom Sub (Part 13), and adding or removing one or more Spacer Washers (Part 14) as required. Then remake, and check it's action, as before.

The Knuckle Joint is located in the fishing string immediately above the fishing tool. The balance of the fishing string, including Fishing Bumper Sub, Hydraulic Jar and Unlatching Joint or Safety Joint, is located above the Knuckle Joint.

The Knuckle Joint is run into the hole to near the fish depth, full circulation being maintained through the tool. As the fish is approached, circulation is halted, and the Restriction Plug is dropped into the fishing string.

CAUTION: Be sure to drop the Restriction Plug with the fishing neck in the upward position; otherwise it cannot be later retrieved.

Circulation is then reestablished to seat the Restriction Plug and maintain it in position. This will deflect the Control Piston, causing the tool to knuckle.

The string may be lowered to engage the fish. It may be necessary to raise and lower the string several times, rotating 5° to 10° each time the string is raised, in order to locate and engage the fish (see picture on page 6).

After the fish is contacted and engaged, circulation is again halted and the Restriction Plug Overshot, run on wire line or small tubing string, is used to retrieve the Restriction Plug. Full circulation may then be utilized to aid in pulling the fish.

If it is impossible to pull the fish by pulling and jarring, then the usual procedure is to run an inside cutter to a point below the stuck point; cut the pipe, and make recovery.

Maintenance

Maintenance of the Bowen-Lebus Knuckle Joint is relatively simple, confined primarily to cleaning and inspection. After use, the tool should be completely disassembled and thoroughly cleaned. All parts should be inspected for signs of advanced wear or damage, and any such parts should be repaired or replaced. All internal parts should be coated with grease or heavy grade oil before the tool is stored.

Complete Disassembly Knuckle Joint

1. To begin disassembly, clamp the Main Body in a suitable vise, horizontally. Do not overtighten the Body in the vise.
2. Remove the Head Connection (Part 1).

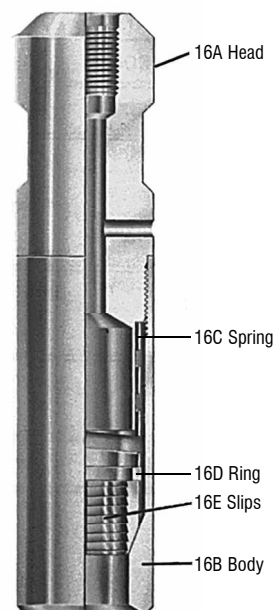
3. Re-clamp on the Pivot Joint Seat (Part 12), and loosen and remove the Bottom Sub (Part 13).
4. Remove the Pivot Joint Seat (Part 12).
5. Remove the Pivot Body (Part 11), from the Pivot Joint Seat.
6. Remove the Drive Pins (Part 9) and O-ring from the Pivot Joint Seat.
7. Re-clamp on the Main Body and remove the Connection Bushing (Part 7).
8. Using a rod or hammer handle, push the Control Lever (Part 5), and Control Lever Cage (Part 6) out of the Main Body.
9. Remove the Packer (Part 3) from the Control Piston (Part 4).

Thoroughly clean all parts and inspect them. Replace or repair any damaged or badly worn parts. Thoroughly grease all parts before they are re-assembled.

Restriction Plug, (Part 16).

1. Clamp in a suitable vise on the Head (Part 16A). Remove the Body (Part 16B).
2. Turn the Body downside-upward, allowing the Slips (Part 16E), Ring (Part 16D), and Spring (Part 16C) to drop free.
3. If the Restriction Plug (Part 15) is in place and must be released, it may be released by screwing it out, using a lefthand screwing action.

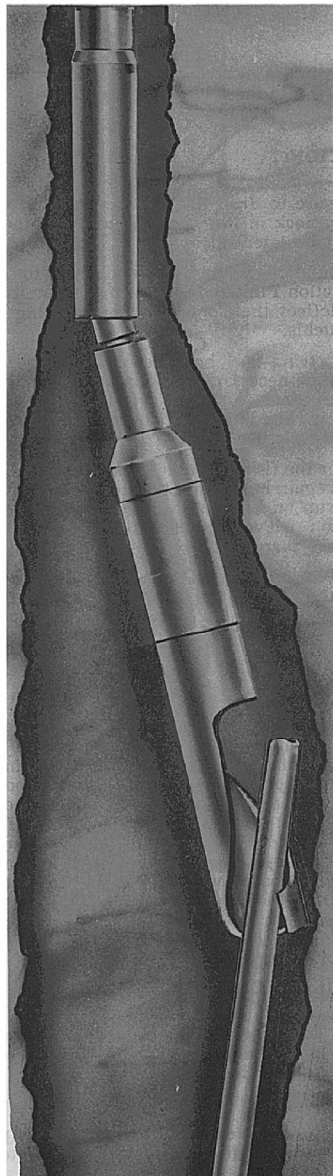
The Packer (Part 15A) may be removed from the Restriction Plug (Part 15) by slipping the bit of a screwdriver under the upper edge and lifting it sufficiently to start it over the retaining shoulder. Use care not to nick or cut the Packer during its removal.



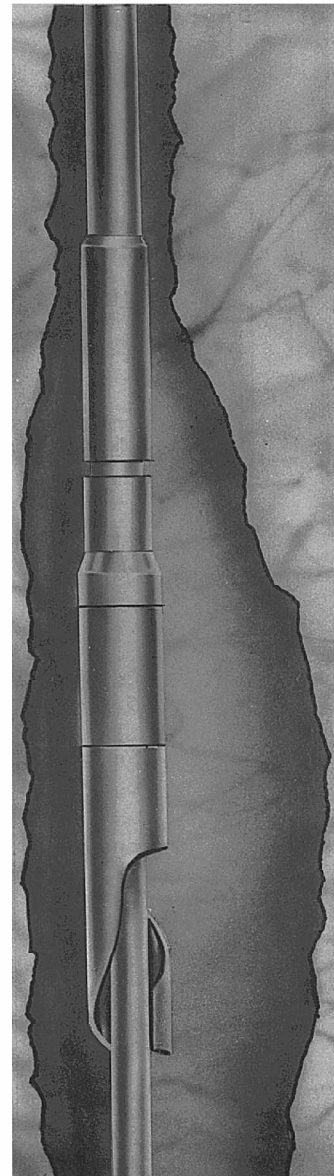
Restriction Plug Overshot



**Knuckle Joint Positioning Overshot
Being Lowered to Engage Fish**



**Bowen-Lebus Knuckle Joint
with Overshot and Wallhook Guide
Contacting Fish in a Cavity**



**After Contacting the Fish,
Ready for Retrieval**

Knuckle Joint		Restriction Plug		Restriction Plug Packer	Control Piston	Restriction Plug Overshot	Restriction Overshot Head
Part No.	O.D.	Part No.	Size (O.D.'s)	Part No.	Part No.	Part No.	Connection
38795	4"	38896	1-9/16" x 1-11/16"	42689	38798	38904	5/8" S.R. Pin
		53267	1-5/16" x 1-7/16"	54872	60556		or
38807	4-1/4"	38896	1-9/16" x 1-11/16"	42689	38810		3/4" S.R. Pin
38819	4-3/4"	38897	1-15/16" x 2-1/16"	42690	38822		
		41866	1-3/4" x 1-7/8"	43623	45810		
		38896	1-9/16" x 1-11/16"	42689	50858		
		53267	1-5/16" x 1-7/16"	54871	54871		
38831	5-3/4"	38899	2-1/2" x 2-5/8"	42691	38834	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50859		
		38897	1-15/16" x 2-1/16"	42690	50860	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	50774		or
		38896	1-9/16" x 1-11/16"	42689	50861		3/4" S.R. Pin
38843	6-1/2"	38900	2-13/16" x 2-15/16"	42692	38846	38916	7/8" S.R. Pin or Box
		38899	2-1/2" x 2-5/8"	42691	50863	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50864		
		38897	1-15/16" x 2-1/16"	42690	50865	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	46450		or
		38896	1-9/16" x 1-11/16"	42689	50866		3/4" S.R. Pin
38856	7-1/4"	38901	2-15/16" x 3-1/16"	42693	38859	38916	7/8" S. R. Pin
		38900	3-13/16" x 2-15/16"	42692	50867		or Box
		38899	2-1/2" x 2-5/8"	42691	50868	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50869		
		38897	1-15/16" x 2-1/16"	42690	50870	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	45052		or
		38896	1-9/16" x 1-11/16"	42689	50871		3/4" S.R. Pin
38870	7-1/2"	38902	3-1/2" x 3-5/8"	42694	38873	38916	7/8" S. R. Pin
		38901	2-15/16" x 3-1/16"	42693	38859		or Box
		38900	2-13/16" x 2-15/16"	42692	50872		
		38899	2-1/2" x 2-5/8"	42691	50873	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50874		
		38897	1-15/16" x 2-1/16"	42690	50875	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	45052		or
		38896	1-9/16" x 1-11/16"	42689	50876		3/4" S.R. Pin

Restriction Plugs, Control Pistons and Restriction Plug Overshots

Knuckle Joint		Restriction Plug		Restriction Plug Packer	Control Piston	Restriction Plug Overshot	Restriction Overshot Head Connection
Part No.	O.D.	Part No.	Size (O.D.'s)	Part No.	Part No.	Part No.	
41385	7-7/8"	38902	3-1/2" x 3-5/8"	42694	38873	38916	7-5/8" S.R. Pin
		38901	2-15/16" x 3-1/16"	42693	38859		or Box
		38900	2-13/16" x 2-15/16"	42692	50872		
		38899	2-1/2" x 2-5/8"	42691	50873	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50874		
		38897	1-15/16" x 2-1/16"	42690	50875	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	45052		or
		38896	1-9/16" x 1-11/16"	42689	50876		3/4" S.R. Pin
38883	8-1/4"	38903	4-1/2" x 4-5/8"	45830	38886	38922	2-3/8" API IF Box
		38902	3-1/2" x 3-5/8"	42694	50877	38916	7/8" S.R. Pin
		38901	2-15/16" x 3-1/16"	42693	50878		or Box
		38900	2-13/16" x 2-15/16"	42692	50879		
		38899	2-1/2" x 2-5/8"	42691	50880	38910	3/4" S.R. Pin
		38898	2-3/16" x 2-5/16"	50885	50881		
		38897	1-15/16" x 2-1/16"	42690	50882	38904	5/8" S.R. Pin
		41866	1-3/4" x 1-7/8"	43623	50883		or
		38896	1-9/16" x 1-11/16"	42689	50884		3/4" S.R. Pin
41418	8-3/4"	38903	4-1/2" x 4-5/8"	45830	38886	38922	2-3/4" API - IF Box
41497	9-5/8"	41512	5-1/2" x 5-5/8"	42695	41501	38922	2-3/8" API - IF Box
		38903	4-1/2" x 4-5/8"	45830	58766		
		38902	3-1/2" x 3-5/8"	42694	58761	38916	3/4" S.R. Pin
		38901	2-15/16" x 3-1/16"	42693	58762		
		38900	2-13/16" x 2-15/16"	42692	58760		
		38899	2-1/2" x 2-5/8"	42691	58763	38910	7/8" S.R. Box
		38898	2-3/16" x 2-5/16"	50885	58764		
		38897	1-15/16" x 2-1/16"	52690	58765	38904	15/16" - 10 Pin or 3/4" S.R. Pin or 5/8" S.R. Pin

Bowen - Lebus Knuckle Joint

Lebus Kinetics Corp.													
O.D. Size			4	4-1/4	4-3/4	5-3/4	6-1/2	7-1/4	7-1/2	7-7/8	8-1/4	8-3/4	9-5/8
Connections			2-7/8	2-3/8	2-7/8	3-1/2	4-1/2	4-1/2	4-1/2	5-1/2	5-1/2	5-1/2	6-5/8
			I.F.	Or	I.F.	I.F.	F.H.	F.H.	I.F.	F.H.	I.F.	I.F.	I.F.
			2-7/8	Or	Or	Or	Or X-	Or	Or	Or	Or	Or	
			I.F.	3-1/2	4-1/2	Hole Or	6-5/8	6-5/8	6-5/8				
					F.H.	F.H.	5-1/2 R		F.H.	F.H.	F.H.		
Maximum Tool I.D.			1-9/16	1-9/16	1-15/16	2-1/2	2-3/16	2-15/16	3-1/2	3-1/2	4-1/2	4-1/2	5-1/2
Lebus													
Part	Complete	Part No.	38795	38807	38819	38831	38843	38856	38870	41385	38883	41418	41497
No.	Assembly	Weight	92	108	140	227	316	361	379	426	479	534	588

Replacement Parts

1	Head	Part No.	38796	38808	38820	38832	38844	38857	38871	41386	38884	41419	41499
	Connection	Weight	10	20	30	55	80	90	90	100	113	125	140
2	Main Body	Part No.	38797	38809	38821	38833	38845	38858	38872	41387	38885	41455	41500
		Weight	15	16	21	34	40	45	60	63	66	70	75
3	Packer	Part No.	41291	41292	41293	41294	41295	41296	41296	41296	41298	41298	41511
		Weight	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	5/16	3/8
4	Control Piston*	Part No.	38798	38810	38822	38834	38846	38859	38873	38873	38886	38886	41501
		Weight	7	9	13	26	30	47	39	43	46	50	55
5	Control Lever	Part No.	38799	38811	38823	38835	38847	38860	38874	38874	38887	38887	41502
		Weight	2-1/2	2-1/2	3	3-1/2	7	9	10	11	12	13	14
6	Control Lever Cage	Part No.	38800	38812	38824	38836	38848	38861	38875	38875	38888	38888	41503
		Weight	2	2	3-1/2	5	8	10	11	12	13	14	15
7	Connecting Bushing	Part No.	38801	38813	38825	38837	38849	38862	38876	41391	38889	41472	41504
		Weight	4	4	7	11	12	14	15	16	17	18	19
8	Retaining Ring	Part No.	—	—	—	—	38850	38863	38877	38877	38890	38890	42055
		Weight	—	—	—	—	2-1/2	3	3	3	3	4	4
9	Drive Or Rotating Pins Per Set	Part No.	38802	38814	38826	38838	38851	38864	38878	38878	38891	38891	41505
		Weight	3/16	1/4	1/4	1/2	3/4	1	1	1-1/2	1-1/2	2	2
10	Packing Ring O-ring	Part No.	30-9	30-10	30-12	30-20	30-23	30-29	30-30	30-34	30-36	30-36	30-42
		Weight	1/32	1/32	1/32	1/32	1/16	1/16	1/16	1/16	1/16	1/16	1/16
11	Pivot Joint Seat	Part No.	38803	38815	38827	38839	38852	38865	38879	41393	38892	41474	41506
		Weight	7	9	12	17	24	35	46	47	48	49	51
12	Pivot Joint Body	Part No.	38804	38816	38828	38840	38853	38866	38880	38880	38893	38893	41507
		Weight	11	11	13	27	39	40	41	43	45	48	53
13	Bottom Sub	Part No.	38806	38817	38829	38841	38854	38867	38881	38881	38894	41479	41509
		Weight	23	24	25	29	52	46	47	64	90	115	135
14	Spacer Washers Per Set of 3	Part No.	38805	38805	38830	38842	38855	38868	38882	38882	38895	38895	41508
		Weight	1/16	1/16	1/16	1/8	1/8	1/8	1/8	3/16	3/16	1/4	1/4

How To Order:

Specify: (1) Name and Number of Assembly or Part
 (2) Any Desired Spares
 (3) O.D. if Other than Standard
 (4) Connections if Other than Standard

Recommended Spares:

(1) 2 Rubber Packers
 (2) 1 Packer Ring
 (3) 1 Overshot
 (4) 1 Restriction Plug

* Refer to Tables on Pages 7 and 8 for Additional Control Pistons and List of Restriction Plugs and Packers.

Bowen - Lebus Knuckle Joint

Lebus													
Part No.	Complete Assembly	Part No.	38795	38807	38819	38831	38843	38856	38870	41385	38883	41418	41497

Replacement Parts (Continued)

15	Restriction*	Part No.	38896	38896	38897	38899	38900	38901	38902	38902	38903	38903	41512
	Plug	Weight	2-1/2	2-1/2	4	7	8	8-1/2	9	9	10	11	11
15A	Restriction*	Part No.	42689	42689	42690	42691	42692	42693	42694	42694	45830	45830	42695
	Packer	Weight	1/32	1/32	1/32	1/32	1/16	1/16	1/16	1/16	—	—	1/16
16	Restriction*	Part No.	38904	38904	38904	38910	38916	38916	38916	38916	38922	38922	38922
	Plug	Weight	4	4	4	5-1/4	5-3/4	5-3/4	5-3/4	5-3/4	6-1/2	6-1/2	6-1/2
16A	Overshot	Part No.	38905	38905	38905	38911	38917	38917	38917	38917	38923	38923	38923
	Head	Weight	2-1/2	2-1/2	2-1/2	2-1/2	2-3/4	2-3/4	2-3/4	2-3/4	3	3	3
16B	Overshot	Part No.	38906	38906	38906	38912	38918	38918	38918	38918	38924	38924	38923
	Body	Weight	1-1/4	1-1/4	1-1/4	2-1/2	2-3/4	2-3/4	2-3/4	2-3/4	3	3	3
16C	Overshot	Part No.	38907	38907	38907	38913	38919	38919	38919	38919	38925	38925	38923
	Spring	Weight	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	1/4	1/4
16D	Overshot	Part No.	38908	38908	38908	38914	38920	38920	38920	38920	38926	38926	38923
	Ring	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/8	1/8	1/8
16E	Overshot	Part No.	38909	38909	38909	38915	38921	38921	38921	38921	38927	38927	38923
	Slips	Weight	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	1/4	1/4

How To Order:

Specify: (1) Name and Number of Assembly or Part
 (2) Any Desired Spares
 (3) O.D. if Other than Standard
 (4) Connections if Other than Standard

Recommended Spares:

(1) 2 Rubber Packers
 (2) 1 Packer Ring
 (3) 1 Overshot
 (4) 1 Restriction Plug

* Refer to Tables on Pages 7 and 8 for Additional Control Pistons and List of Restriction Plugs and Packers.

Calculated Strength Bowen - Lebus Knuckle Joints

Assembly Number	Outside Diameter – Inches	Maximum Inside Diameter – Inches	Tensile* Strength @ Yield Point – In LBS.	Torque* Strength @ Yield Point – In FT. - LBS.
38795	4	1-9/16	269,400	12,700
38807	4-1/4	1-9/16	332,880	12,880
38819	4-3/4	1-15/16	359,160	18,508
38831	5-3/4	2-1/2	565,440	37,500
38843	6-1/2	2-13/16	637,080	49,921
38856	7-1/4	2-15/16	940,440	68,638
38870	7-1/2	3-1/2	808,680	70,175
38883	8-1/4	4-1/2	753,000	80,085

* The strengths shown are theoretical calculations based on yield strength of the material used in each case. The strengths shown are therefore accurate plus or minus 20% of the figure shown, only.

These figures do not constitute a guarantee, actual or implied; they are meant to serve as a guide only, and appropriate allowance must be made in use, as a safety factor.

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* Denotes Manufacturing and Engineering facilities

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions